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Exundative* hyphaema after cataract extraction

Role of paracentesis and anterior chamber lavage in therapy

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Hyphaema, both postoperative and traumatic, is often encountered in clinical practice. The frequency and complications of traumatic hyphaema have been described by Thygeson and Beard (1952), Loring (1958), Goldberg (1960), Henry (1960), and Liebman, Pollen, and Podos (1962).

Therapeutic procedures recommended include miotics (Rychener, 1944), hot and cold compresses (Kushner, 1959), and anterior chamber irrigation with proteolytic enzymes (Podos, Liebman, and Pollen, 1964; Sinskey and Kricheskey, 1962; Scheie, Ashley, and Weiner, 1961; Pierse and Legrice, 1964). Sinskey and Kricheskey (1959) observed that neither miotics nor mydriatics had any detectable effect on the absorption of ^{51}Cr. labelled red cells injected into the anterior chamber of rabbits. Cole and Byron (1964) suggested a combination of enzymatic irrigation of the anterior chamber and intravenous administration of urea, and Kwitko and Costenbader (1962) advised intravenous urea in the treatment of every case of hyphaema with a sustained increase in intraocular pressure. Ahuja and Kaothalkar (1969) discussed the effect of urea, sucrose, sorbitol, and glycerol on the resorption of hyphaema using radioactive blood injected into the anterior chamber of rabbits.

In the ophthalmic literature postoperative hyphaema is rarely discussed, probably because, although common, the majority spontaneously absorb with no apparent long-term sequelae. Kjeldsen (1965) described the treatment by intravenous mannitol of nine patients with postoperative hyphaema after cataract extraction. Pierse and Legrice (1964) advised the use of Urokinase to irrigate the anterior chamber when bleeding occured during surgery, and where the clot was extensive enough to interfere with surgical procedures. Lewis (1958) used an intravenous preparation of conjugated oestrogenic substances as a prophylactic in six patients before cataract operation. Duthie (1955) suggested paracentesis with anterior chamber lavage to prevent complications in severe postoperative hyphaema.

The classification, results, and aetiology are discussed in 28 cases of postoperative hyphaema requiring paracentesis and anterior chamber lavage with normal saline.

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†Exundative = overflowing in abundance, excess.

Classification of postoperative hyphaema

Hyphaema after intraocular surgery, severe enough to require paracentesis and anterior chamber lavage, is defined as a postoperative exundative hyphaema. Surgical hyphaema is excluded. If, after 5 days, a total hyphaema is either stationary, or has not absorbed to less than three-quarter size, operation is advised. Also, a hyphaema which gradually increases to a three-quarter or total hyphaema over a variable number of days should be irrigated.

Clinically, an exundative hyphaema is divisible into two types, in which the amount of blood-clot depends on the degree of aqueous dilution:

(1) refractory exundative hyphaema;

(2) accretion exundative hyphaema.

(1) This begins as a total hyphaema and absorption, if it occurs, never progresses beyond a three-quarter hyphaema. A well-defined fluid level and chromatic zones are absent. The patchy colouring includes all shades of red and the surface is often streaked with fresh bright red blood.

(2) This starts as a small hyphaema, with or without blood-clots on the vitreous face, and intermittent fresh haemorrhage adds to the blood volume to form a three-quarter or total hyphaema. The characteristic features are initially a well-defined fluid level and the chromatic zones, *i.e.* horizontal zones of dark red, red, and bright red blood, the latter occupying the superior zone.

The size of a hyphaema is described as a trace, either fluid or blood-clot, a quarter, a half, a three-quarter, or a full or total hyphaema; a crude indication of the volume of blood occupying the anterior chamber. Classification based on naked eye or corneal loupe examination excludes the necessity of subjecting recently-operated patients to slit-lamp examination, unless a hand slit-lamp is available.

Material and methods

The series consisted of 28 eyes in 28 patients (23 female and 5 male) operated upon during a period of 6 years. No bilateral cases were observed.

A von Graefe knife was used for 23 sections and keratome and scissors for five. Broad iridectomy was performed at every operation. Paracentesis was by keratome incision in the infero-temporal quadrant at the corneal margin of the limbus, with no reflection of conjunctiva. Depression of the posterior lip by an iris repositor released any fluid blood; this was followed by irrigation of the anterior chamber with 2 ml. normal saline, and further release of blood-saline fluid. Blood-clot incarcerated in the incision was removed by capsule forceps. The anterior chamber was not reformed.

Gonioscopic examination was carried out in eight patients.

Results

The patients' ages ranged from 42 to 83 years (Table I). 21 patients had a significant history of a preoperative systemic or ocular disorder (Table II). In addition, eighteen patients, including ten in Table II, had been observed to have evidence of retinal atherosclerosis. Patients with a raised diastolic blood pressure who were not on hypotensive therapy had been advised against such treatment. There were 22 refractory hyphaema and six accretion.

Table I *Age distribution of 28 patients*

Age (yrs)	42–51	52–61	62–71	72–81	82+
No. of patients	3	7	7	10	1

Table II *Pre-operative clinical history in 21 patients*

History	*No. of cases*
Myopia with vitreous floaters	3
Diabetes mellitus	9
Severe chronic bronchitis	1
Trauma to globe	2
Diastolic pressure 100–110 mm. Hg	6

Fig. 1 shows the effect upon the size of a hyphaema after paracentesis and lavage of the anterior chamber. Eight had disappeared by the first day after operation and eleven by the second day. Two eyes required repeat operations, one of which had no hyphaema by the second day, but subsequently developed a three-quarter hyphaema. Another eye developed severe uveitis manifested by a cloudy cornea and mutton-fat keratic precipitates, Two eyes retained blood-clot on the anterior vitreous face into the fourth week after paracentesis.

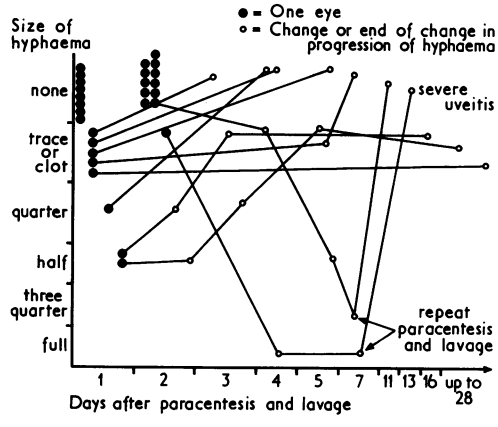

FIGURE *Size of hyphaema after paracentesis and lavage of anterior chamber*

Table III records the visual acuity 12 months after cataract extraction. Because of poor surgical technique, seventeen operations were described as "attempted intracapsular, extracapsular extraction". An additional three patients had vitreous loss during or after

Table III *Visual acuity after cataract extraction*

Operation	*Visual acuity*								
	6/6	6/9	6/12	6/18	6/24	6/36	6/60	*CF*	*PL*
Failed intracapsular	1	6	1(1)	3(2)	1(4)	1(5)	1(6)	2(6)	1(7)
Vitreous loss	1	1	—	—	—	—	—	—	1(8)
Intracapsular	2	2	1	1(3)	1	—	—	1(6)	—
No. of patients	4	9	2	4	2	1	1	3	2

(1) Arteriosclerotic retinopathy
(2) 2 senile macular dystrophy; 1 diabetic retinopathy
(3) Senile macular dystrophy
(4) After cataract
(5) Myopic degeneration
(6) Diabetic retinopathy
(7) Vitreous haemorrhage; myopia
(8) Phthisis bulbi; history of severe trauma

intracapsular extraction. In a number of eyes, visual results were influenced by preoperative ocular pathology. No capsulotomies were performed during the 12-month period.

Gonioscopic examination revealed no definite traumatic cleavage of the chamber angle.

Discussion

Kilgore (1942) suggests that, in traumatic hyphaema, ciliary body tears are the most frequent lesion. Thygeson and Beard (1952) found ciliary body damage in two eyes obtained by enucleation, and Collins (1892), Parsons (1908), Lister (1924), and Lamb (1927) described similar findings. Relatively mild trauma might cause a tear into the trabeculae or ciliary body (Wolff and Zimmerman, 1962; Hogan and Zimmerman, 1962). Petitt and Keates (1963), Alper (1963), and Britten (1965) described eyes with traumatic cleavage of the chamber angle. Duke-Elder (1940, 1954) considered that the basic lesion was an iridodialysis.

Postoperative hyphaema after cataract extraction is thought to occur from disturbances of the capillaries uniting the section. In this series, fifteen patients had hypertension or diabetes, and in eighteen there was definite evidence of some degree of retinal atherosclerosis. Three eyes were myopic with synchisis of the vitreous and two eyes had suffered previous trauma. These conditions suggest the possibility of vascular disease or damage involving the wall of a vessel in the anterior uveal circulation. It is considered that at least twenty eyes were exposed to excessive surgical manipulation. The consequences of wrestling with a non-presenting cataract may be as weakening to blood vessels as to the surgeon. Vitreous loss may imply a clumsiness in surgical technique. The persistence and severity of an exundative hyphaema may indicate injury to a diseased blood vessel, possibly by stretching of the wall, and later, leakage of blood through the damaged area. A refractory hyphaema is due to an initial large leak with subsequent seepage of blood through the vessel wall, whilst an accretion hyphaema is caused by repeated small haemorrhages. It is therefore suggested that these types of postoperative hyphaema are due to trauma occurring during operation, and involving diseased vessel walls in the anterior uveal circulation, either in the iris or ciliary body. The latent period is variable and dependent on changes in the haemodynamics of the uveal circulation. The mean intraocular vascular pressures are higher than in comparable vessels elsewhere in the body. A cataract operation recorded as "intracapsular extraction" may have been difficult and prolonged, and the possibility of trauma cannot be excluded. Unfortunately, gonioscopy was possible in eight eyes only, and examination revealed a normal aphakic chamber angle. No patient admitted to postoperative injury of the eye, nor was any observed by the nursing staff.

The two most feared complications of total hyphaema ("eight-ball haemorrhage") are secondary glaucoma and bloodstaining of the cornea. Glaucoma is especially liable to occur with secondary haemorrhage (Goldberg, 1960). These complications did not occur in this series, possibly due to relatively early surgical intervention. In diabetic patients blood-clot may become organized, an end result being a vascularized fibrotic membrane on the anterior vitreous face.

By the second day paracenteses and anterior chamber lavage had resulted in the disappearence of nineteen hyphaemas. Two eyes required a repeat operation, but within a period of 28 days no haemorrhage or blood-clot was visible in the anterior chamber of any eye. The only complication was anterior uveitis which cleared after treatment, the

final visual acuity being 6/9. Blood-clot was readily broken up by saline irrigation of the anterior chamber, as confirmed by Liebman and others (1962). With the exception of one eye, poor visual results were due to pre-existing retinal pathology or damage to the globe, and they do not agree with the results of surgical intervention in traumatic hyphaema (Cole and Byron, 1964).

The influence of an after-cataract on visual acuity is determined by the stage during operation at which the capsule broke, the amount of lens matter washed out of the anterior chamber, the degree of absorption of lens matter, and the situation of the after-cataract relative to the visual axis. The decision to perform anterior chamber lavage in cases of vitreous loss is the responsibility of an individual surgeon, and the opinions on the advisability will vary. In this series, the visual acuity in two cases was 6/9 or better.

Osmotic agents such as urea and mannitol may have undesirable side-effects, including thrombophlebitis, cutaneous necrosis, mental confusion, and pulmonary oedema (Tarter and Lynn, 1961; Small, 1960; Davis, Duehr, and Javid, 1961; Ackerman, 1961; Oosterhuis, 1962; Bernstein, Blumberg, and Arkin, 1958). Enzymatic irrigation of the anterior chamber is unnecessary. Because of the ephemeral nature of the majority of hyphaema, the efficacy of Adrenoxyl, Chymoral, Rutin, and Dicynene is difficult to evaluate.

Summary

A new terminology is proposed for some cases of postoperative hyphaema, based on the severity, persistence, and physical appearance of the haemorrhage. It is suggested that this type of latent hyphaema (exundative hyphaema) occurs when diseased vessel walls in the anterior uveal circulation are damaged during difficult surgical manipulations.

The results of paracentesis and anterior chamber lavage with normal saline in 28 eyes with postoperative hyphaema are discussed. It is considered to be a safe and effective operation. A possible complication was seen in one eye which developed uveitis, but the condition responded well to treatment.

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